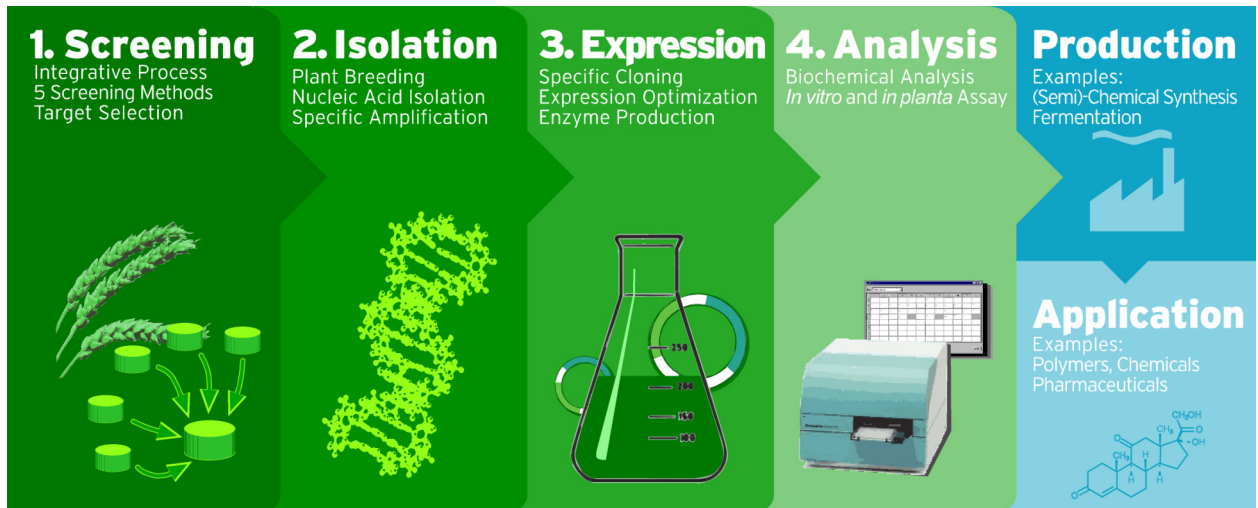


phytomining

With our **phytomining** process and our 10 years of experience in plant biotechnology Phytowelt GreenTechnologies GmbH is the ideal partner to unlock the resources of plant biodiversity for the advancement of industrial production processes. The results of our work open innovative routes to the optimization of production processes for industrial raw materials und intermediates. Enzymes with activities and substrate specificities that meet the demands and specifications of our clients will be isolated, analyzed and finally transferred to the client for integration in their production processes. **phytomining** is the first element of our new service package:

Plantdustrial – Linking Plant and Industrial Biotechnology



Introduction

For thousands of years plants have been valued as the source and the foundation for energy, nutrition, medication, cosmetics and other commodities of human society. For pro-

duction processes, the biomass of plants has been used as an energy source, as well as a source of a multitude of raw materials, such as fats, oils and natural polymers like cellulose, caoutchouc or starch. Only recently have we

come to see plants as a cornerstone of sustainable industry by exploiting lead structures and biosynthetic pathways for the modification of plant derived, renewable resources. By using natural enzymes for chemical production, industrial biotechnology offers versatile applications for plant enzymes and intermediates. Reducing the number of process steps and involving alternative resources result in saving energy and an increase of efficiency and sustainability. This has recently been shown on the basis of the synthesis of sterically demanding chemicals or the production of highest quality grade chemicals such as steroid hormones from plant sterols.

Our Methodology

In the area of enzyme discovery, especially enzymes of plant origin, Phytowelt Green-Technologies GmbH excels with **phytomining**, a combinatorial approach. In four steps the efficient and targeted selection of the desired enzyme is achieved.

In STEP ONE, the In Silico Screening, five integrative modules - reaction screening, product screening, structural screening, cluster screening and network screening - are combined to identify plant gene sequences for the requested enzyme activity. By means of an innovative combinatorial approach, we are able to significantly increase the specificity of our enzyme detection in each module.

STEP TWO of the **phytomining** process, the Enzyme Isolation yields the candidate genes. In this step we rely on our long experience in providing high quality plant material (from plant cultivation to metabolite and cDNA/gene isolation).

After cloning and evaluation, the isolated sequence will be shuffled into an appropriate expression vector (Enzyme Expression, STEP THREE), including codon optimization and adaptation of the host cell.

In STEP FOUR (Enzyme Analysis), enzyme activity is characterized in detail in regard to biochemical parameters such as pH dependency, temperature and co-substrates. Different assay systems are offered – ranging from photometric analyses to in planta activity screening in plant cell cultures.

Conclusion

Our four step integrative approach of **phytomining** offers the opportunity to increase the efficiency of current production processes, e.g. by complementing microbial production lines with a suitable gene, or implementing completely new and innovative fermentation processes.

Phytowelt's approach unlocks the huge potential of plant biodiversity for our clients. The targeted and efficient system of **phytomining** opens a superior way to exploit the current know-how in genomics, transcriptomics and metabolomics. **phytomining** complements HTS approaches like metagenome screening through its intelligent, knowledge based and targeted selection. In certain cases **phytomining** will be the superior alternative.